IN THE CLAIMS:

Kindly amend the claims as follows:

1. (Previously Presented) A method of dry treating a target surface prior to using the target for sputtering comprising:

a) preparing a target assembly and securing said target assembly in a vacuum chamber of a magnetron sputtering apparatus;

b) energizing the magnetic component of the magnetron sputtering apparatus with a power between about 0.2 kW and about 4 kW for a period of time between about 4 and about 30 minutes to produce a surface dry treatment of a sputtering ion plasma on an exposed surface of the target to effectively reduce inherently undesirable impurities on the surface

c) removing the treated target assembly from the magnetron sputtering apparatus; and

d) preparing and packaging the target assembly for subsequent use in a sputtering deposition process.

2. (Original) The method of claim 1 wherein the magnetron sputtering apparatus is rotatable and the magnetic component of the magnetron sputtering apparatus is disposed on less than a 180° arc measured at the axis of rotation of the apparatus so as to produce a rotatable sputtering ion plasma on the surface of the target.

3. (Original) The method of claim 1 wherein the target surface is treated for a time period between about 8 and about 10 minutes and a power of between about 0.2 kW and about 0.4 kW.

4. (Previously Presented) The method of claim3 wherein the target surface is treated in an inert atmosphere.

5. (Currently amended) The method of claim 6 wherein ~~the~~ an inert atmosphere is argon.

6. (Original) The method of claim 1 wherein after removing the target assembly from the magnetron sputtering apparatus in step c), at least the surface treated portion of the target assembly is placed in an enclosure to protect it during storage and shipment.

7. (Previously Presented) The method of claim6 wherein the enclosure is metallic and the metallic enclosure containing the target assembly is further placed into a different enclosure.

8. (Previously Presented) The method of claim 1 wherein the target material selected from the group consisting of titanium, aluminum, copper, molybdenum, cobalt, chromium, ruthenium, rhodium, palladium, silver, osmium, iridium, platinum, gold, tungsten, silicon, tantalum, vanadium, nickel, iron, manganese, germanium, or alloys thereof.

9. (Original) The method of claim 2 wherein the magnetic component is FeNdB.

10. (Original) The method of claim 2 wherein the following step is added:

d) assembling the treated target assembly into a sputtering apparatus to coat the substrate and then sputtering the target and the burn-in time required is reduced by at least 10% using the treated target of step b) compared to an untreated target.

11. (Original) The method of claim 10 wherein the target surface is treated for a time period between about 8 and about 10 minutes and a power of between about 0.2 kW and about 0.4 kW.

12. (Previously Presented) The method of claim 11 wherein the target material selected from the group consisting of titanium, aluminum, copper, molybdenum, cobalt, chromium, ruthenium, rhodium, palladium, silver, osmium, iridium, platinum, gold, tungsten, silicon, tantalum, vanadium, nickel, iron, manganese, germanium, or alloys thereof.

13. (Original) A treated target assembly made by the method of claim 2.

14. (Original) The treated assembly of claim 13 wherein the target surface is treated for a time period between about 8 and about 10 minutes and a power of between about 0.2 kW and about 0.4 kW.

15. (Previously Presented) The method of claim 10 wherein the target material is selected from the group consisting of titanium, aluminum, copper, molybdenum, cobalt, chromium, ruthenium, rhodium, palladium, silver, osmium, iridium, platinum, gold, tungsten, silicon, tantalum, vanadium, nickel, iron, manganese, germanium, or alloys thereof.

16. (Original) A magnetron sputtering apparatus comprising a vacuum chamber with a surface defining an opening adapted for securing a removable target assembly; support structure surrounding the opening of the vacuum chamber and spaced outside of securing means for the removable target, a rotating magnet assembly secured to the support structure and disposed over the opening and adapted to be spaced apart from the removable target assembly, motor means for rotating the magnet assembly, and power means for energizing the magnet assembly.

17. (Original) The magnetron sputtering apparatus of claim 16 wherein the magnetic component of the magnetron sputtering apparatus is disposed on less than a 180° arc measured at the axis of rotation of the apparatus so as to produce a rotatable sputtering ion plasma on the surface of the target.

18. (Original) The magnetron sputtering apparatus of claim 17 wherein the magnet assembly contains a FeNdB magnet component.

19. (Original) The magnetron sputtering apparatus of claim 17 wherein the vacuum chamber comprising a bottom support plate, an upper support plate defining the opening and viton vacuum seal side enclosure.

20. (Original) The magnetron sputtering apparatus of claim 19 wherein a removable target assembly is secured into the opening in the upper support plate.

REMARKS

Entry of the foregoing, and consideration of the subject matter identified in caption, as amended, and in light of the remarks which follow are respectfully requested.

By the above amendments, claim 5 has been revised as discussed below. The amendment does not include any new matter.

Turning to the Official Action, claim 5 stands rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. This objection has been obviated by above amendment, where antecedence has been provided to the term inert atmosphere. Thus, withdrawal of this rejection is respectfully requested.

Claims 1, 3, 4-8, and 16 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Dunlop et al (U.S. Patent No. 6,030,514) in view of Leiphart (U.S. Patent No. 6,187,151 B1) and Levine et al (U.S. Patent No. 5,846,389). This rejection is traversed for the following reasons.

The present invention relates to a method of dry treating a sputtering target to achieve an enhanced finish on the surface that effectively reduces burn-in time of the target.

Dunlop et al relates to a method of reducing sputtering conditioning time or so called burn-in and a target assembly thereof. Col. 1 lines 6-9. Based on the comments in the Official Action, it appears that this document has been applied as the primary reference for the disclosure of "pretreating a sputter target assembly and then preparing and packaging the assembly to be subsequently used in a sputtering process . . .". See Official Action at page 3. Thus, it appears that this document has been applied for the purported preparation of the target surface prior to packaging. However, as recognized by the Examiner, Dunlop et al does not disclose any of the steps claimed in the present invention. See Official Action at page 3. Leiphart does not cure the deficiencies in Dunlop et al and even assuming *arguendo*, albeit incorrectly that it does, one of ordinary skill in the art would not look to combine the disclosure of these documents as the

process parameters of Leiphart would not be necessary to condition the target of Dunlop et al, which is already conditioned.

In this regard, Leiphart is directed to a method of in-situ cleaning and deposition of device structures in a high density plasma environment. Leiphart, however, does not disclose or fairly suggest conditioning the target prior to its utilization is a sputtering deposition process. Leiphart states that:

> The present invention a method for in-situ plasma cleaning and sputter deposition in a single high density plasma chamber during the processing of a device structure. The present method is particularly useful for cleaning high aspect ratio device structures. (Emphasis added). Col. 1, lines 52-56.

Thus, clearly Leiphart does not contemplate pre-treating the surface of the target to reduce burn-in, nor the removal of impurities from the surface of the target, but rather discloses cleaning and depositing on the device structure during the processing of the device structure. On the other hand, in the present invention and as explained in Applicant's Specification, at pages 1-2, the preparation of the target reduces the lengthy burn-in time for targets delivered to customers (i.e., which are utilized in the deposition process). Further, the pre-treatment reduces the impurities on the surface of the targets and provides for the formation of uniform film deposition during the deposition processes. Moreover, as explained above, the process of Leiphart would not be utilized in conjunction with the target of Dunlop et al, as this target is already conditioned.

Levine et al has been applied for the alleged disclosure of a rotating magnetron behind a target. See Official Action at page 4. However, Levine et al does not cure the above-described deficiencies in Leiphart. In particular, Leiphart does not disclose the dry treatment of the target surface prior to its use in a sputtering deposition process, much less the particular power set forth in step (b) of independent claim 1.

In this regard, Levine et al states:

> The rotating magnet assembly 28 provides a magnetic field adjacent the top surface 26 of the target facing the wafer to confine the ion "plasma" adjacent the target and thereby enhance the sputter coating process. Col. 3, lines 28-33.

Therefore, like Leiphart, Levine et al discloses the use of the rotating magnet during the sputter coating process, and not as a means for conditioning the target surface prior to the sputtering deposition process. Accordingly, even if combined in the manner suggested with Dunlop et al, the skilled artisan would not arrive at the presently claimed invention. Thus, withdrawal of this rejection is in order and it is respectfully requested.

Claims 2, 10-15, 17, 19 and 20 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Dunlop et al in view of Leiphart and Levine et al and further in view of Ding et al (U.S. Patent Application No. 2003/0089601 A1). This rejection is traversed for the following reasons.

Dunlop et al, Leiphart and Levine et al have been discussed in detail above. Ding et al disclose an array of auxiliary magnets positioned along sidewalls of a magnetron sputter reactor on a side towards the wafer from the target. See Abstract. Ding et al has been applied for allegedly disclosing a sputtering apparatus including a rotating magnetron system "comprises less than 180 degrees". See Official Action at page 5.

Ding et al simply does not cure the deficiencies in Leiphart and Levine et al. Particularly, Ding et al does not disclose or suggest or disclose the dry treatment of the target surface prior to its use in a sputtering deposition process. Accordingly, withdrawal of this rejection is in order and it is respectfully requested.

Claims 9 and 18 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Dunlop et al in view of Leiphart and Levine et al and further in view of Arai et al (U.S. Patent No. 6,187,457). This rejection is traversed.

Leiphart and Levine et al have been discussed above. Arai et al relates to an electroluminescent light emitting device using an organic compound in which an electron injecting electrode for supplying electrons to a light emitting layer is provided thereon with a sealing film. See Col. 1, lines 5-11. Arai et al has been applied for allegedly disclosing the use of FeNdB magnet. However, Arai et al does not even concern a magnetic component to be utilized in a sputtering system, much less cure the deficiencies in Leiphart and Levine et al. Thus, withdrawal of this rejection is respectfully requested.

Claims 13-15 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as allegedly being obvious over Leiphart. With respect to claim 13, it is noted that Leiphart does not disclose the magnetron sputtering apparatus disposed on less than 180° arc, as discussed above. Regarding, claim 15 kindly note that Leiphart does not disclose or suggest a pre-treated target where the burn-in time has been reduced 10%. Accordingly, withdrawal of this rejection is respectfully requested.

If there are any questions concerning this paper, or the application in general, the Examiner is invited to telephone the undersigned at his or her earliest convenience.

Respectfully submitted,

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